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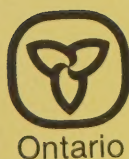
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Economic Impacts of Renovation in Ontario

Background Report

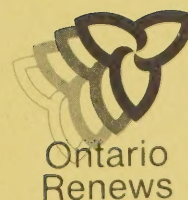
to

"BUILDING TOWARD 2001"



Ministry of
Municipal Affairs
and Housing

Claude F. Bennett
Minister



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ECONOMIC IMPACTS OF
RENOVATION CONSTRUCTION ACTIVITY

Prepared for
Community Renewal Branch
Ontario Ministry of Housing


by
Clayton Research Associates Limited
November, 1980

SUMMARY

- The purpose of this study is to assess the relative impacts of new versus renovation residential construction.
- On a dollar-for-dollar basis, residential renovation construction has greater overall income and employment impacts than does new residential construction.
- More direct construction jobs are created with the initial expenditure on renovation than with a similar expenditure on new work; indirect jobs created in industries supplying the construction industry are lower for renovation than new work, but are not sufficient to offset the higher number of direct jobs in renovation.
- The higher incomes generated by the given expenditure on residential renovation work also leads to greater induced income and employment impacts than is the case for new residential construction.
- In 1976, an expenditure of \$100 million on total residential construction would have led to the creation of a total of about 6,600 manyears of work; a similar expenditure on residential renovation work would have led to the creation of about 7,800 manyears.
- The two different renovation estimates prepared for this report did not show significantly different employment impacts despite substantial differences in the types of materials inputs.
- Over 80 percent of the employment created as a result of an expenditure on residential construction in Ontario actually occurs in Ontario. The Ontario proportion appears to be slightly higher for renovation work than new work.

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	
INTRODUCTION	1
PROCEDURES	2
TYPE OF IMPACTS	2
INPUT-OUTPUT MODELS	3
ESTIMATING A RENOVATION INPUT STRUCTURE	4
ESTIMATING THE IMPACTS	5
INTERPRETING THE RESULTS	6
The Nature of Renovation	6
Differences in Job Size	7
Changes Since 1976	7
RESULTS	8
DIRECT IMPACTS	8
INDIRECT IMPACTS	10
INDUCED IMPACTS	11
TOTAL IMPACTS	12
INTERREGIONAL IMPACTS	14
QUALIFICATIONS	15
APPENDIX A	A-1
APPENDIX B	B-1



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INTRODUCTION

This study was commissioned by the Ontario Ministry of Housing following the completion of the Residential Rehabilitation and Conversion Study in June, 1980. This earlier study contained a brief section on the economic impact of renovation activity; however, the results up to that point were inconclusive. The analysis in this report draws on the results of the earlier study as well as on additional work in the area.

The purpose of this study is to assess the relative impacts on employment and income of new versus renovation residential construction activity. Two approaches to estimating the impacts of renovation activity are presented in this report. Both utilize the Statistics Canada Input-Output Model, but they use different assumptions regarding the inputs to renovation construction. The two approaches are:

- Renovation Estimate I - based on the use of United States input-output data which has been adjusted as far as possible to reflect Canadian circumstances (unlike the Canadian input-output model, the U.S. model differentiates between new and renovation construction activity); and
- Renovation Estimate II - formulated from interviews with a small sample of architects and renovation contractors as well as from other information sources available to the consultant.

When compared to the known impacts of total residential construction activity, these two approaches together indicate the likely direction of the relative impacts of new versus renovation residential construction in terms of employment and income.

This report is structured such that most of the details are provided in two Appendices which are rather technical in nature. The main body of the report is relatively short and attempts to be as non-technical as possible given the nature of the topic in discussion.

Further investigation of the economic impact of renovation construction is proceeding within Statistics Canada and Canada Mortgage and Housing Corporation. The orientation of that work, however, is more directed at estimating overall renovation activity and its impacts rather than the relative impacts of a certain dollar expenditure on employment - the objective of this study. Despite this different orientation, it may be possible, following the completion of the Statistics Canada-CMHC work, to obtain more reliable estimates of the relative impacts than those presented here.

PROCEDURES

Assessing the economic impact of residential renovation construction compared to new residential construction is a complicated effort as very little consistent and reliable information is available on renovation activity. Before presenting the discussion of the actual estimated impacts, it is instructive to explain briefly the procedures used in the analysis. This chapter attempts to clarify the concepts and methods utilized in the formulation of the estimates which are presented in the next chapter.*

TYPES OF IMPACTS

The types of impacts which are of interest in this study are the overall employment and income impacts. With the use of an input-output model (explained further below), it is possible to separate three distinct rounds of income and employment impacts of any economic activity. Taking a construction project as an example, the three rounds of impacts would be:

- Direct impacts - the actual jobs and income resulting from the construction projects themselves (including both on-site and off-site work);
- Indirect impacts - the jobs and incomes created in other industries in order to produce the materials and other inputs necessary for the construction work; and
- Induced impacts - the jobs and income created in the total economy as a result of the so-called "Keynesian Multiplier", i.e., the income and employment impacts throughout the economy resulting from the expenditure of the incomes generated to households in the first two rounds.

These impacts can be quite different for different types of economic activity. To preview briefly some of the results presented later, renovation activity is generally considered to have a higher construction labour component than new construction - therefore, the direct impact of a given expenditure on renovation construction in terms of jobs and income would be expected to be greater than the same expenditure on new construction.

* This report differentiates between residential renovation construction and total residential construction. Total residential construction includes new work, renovation work and repair work.

This does not necessarily mean that the overall impact of renovation construction would be greater than for new construction; the indirect impacts will be lower for renovation construction simply because there is a smaller proportion of the given expenditure going to materials and other inputs. Also, the actual inputs are likely to be different for renovation and new construction and, since there can be a significant variation in the degree of labour input into the manufacture of different building materials, this will affect the overall labour impact as well.

Induced impacts will also vary by type of activity, but only because the total income generated in the first two rounds will vary for different activities.

INPUT-OUTPUT MODELS

An input-output model is useful in the derivation of the types of impacts discussed above. Such a model can take an expenditure of a given sum on a given economic activity and translate it into, first, the direct impacts in terms of both labour and other input requirements and, second, the indirect and induced impacts.

The main component of an input-output model is the set of "input structures" for each economic activity covered by the model.* An input structure literally splits the original expenditure among all the different inputs which are used in that industry. For construction work, as an example, an expenditure of \$1 million might result in around \$300,000 in direct construction wages and salaries; the remaining \$700,000 would be split among the wide variety of other inputs to construction activity such as wood products, cement products, metal products, and profit margins. Each of these inputs, in turn, has an input structure of its own which involves labour as well as inputs from other industries and so on.

An input-output model includes a large set of input structures which have been estimated for all industries in the economy. Use of the model allows an analysis to be made of the impacts of any type of activity on the overall economy as well as on any other specific industry - it also allows one to determine the overall employment and income impacts in any specific industry.

* See Appendix A for an example of the input structure for total residential construction in Canada in 1976.

The specific use of the input-output model in this study involves the estimation of the relative impacts of a \$100 million expenditure on residential renovation construction compared to a similar expenditure on total residential construction (used here as a proxy for new construction). The main problem which had to be overcome in this study is that the Canadian input-output model does not differentiate between new residential construction and residential renovation construction - these are lumped together in the Canadian model along with repair work into "Total Residential Construction."

ESTIMATING A RENOVATION INPUT STRUCTURE*

Two approaches were adopted in attempting to estimate a Canadian residential renovation input structure:

- The United States input-output model differentiates between new and renovation residential construction activity; an estimated Canadian residential renovation input structure was formulated based on the differences in the U.S. input structures and the overall differences between the Canadian and American total residential construction input structures, - Renovation Estimate I.
- Based on discussions with persons involved with renovation construction and others knowledgeable about the inputs required for renovation activity, the total residential construction input structure for Canada was modified to approximate an estimated renovation input structure - Renovation Estimate II.

Neither of these approaches is considered to be as reliable as the type of input structure which Statistics Canada would formulate in the process of breaking down the total residential construction category.** The detailed surveys and scientific techniques behind such an endeavour by Statistics Canada could not be approximated in the time and budget available for this study. The results are, however, considered to be indicative of the general direction and broad magnitude of the differential impacts of renovation versus new residential construction.

* The method of estimation of the input structures used in the analysis is covered in more detail in Appendix A.

** In fact, Statistics Canada and Canada Mortgage and Housing Corporation are currently exploring the possibility of splitting this category into new and renovation; however, it appears unlikely that results will be forthcoming for some time.

Since Appendix A of this report presents in considerable detail the actual methods used in formulating these two estimated input structures, they will not be covered in detail here.

Time and budget constraints also limited the amount of work which could be devoted to estimating the impacts of new residential construction. Because the main focus of the study is renovation work, it was considered that a comparison of residential renovation construction impacts with "total residential construction" impacts would be sufficient to point out likely broad differences in the impacts of new and renovation work - the alternative would have been to attempt to estimate a separate input structure for new construction as well as renovation and, because of the limited budget available, this would have constrained the extent of the analysis in other areas. Estimation from the U.S. input-output data thus concentrated on renovation only, new construction was ignored. In the second approach, involving estimation of the renovation input structure from information provided by people in the industry, it was necessary to compare explicitly the inputs involved in new versus renovation construction in order to arrive at the estimated input structure for renovation work. Only the renovation input structure was actually formulated, however.

ESTIMATING THE IMPACTS

Once the input structures are estimated, it is a relatively simple procedure to feed the data into the input-output model which then calculates the direct, indirect and induced impacts on each separate industry and then the economy as a whole. The method used in this study is to assume a total expenditure of \$100 million on each of the activities under discussion and then to analyse the results of each type of activity. Three separate estimated input structures for Canada were run through the Statistics Canada Input-Output Model:

- Total residential construction as it currently is estimated by the Statistics Canada model;
- Residential renovation construction as it was estimated by this study from U.S. input-output data (called Renovation Estimate I); and
- Residential renovation construction as it was estimated by this study from discussions with contractors, etc. (called Renovation Estimate II).

The results (presented in the next chapter) compare the impacts of the three different input structures. The analysis focuses on three separate issues:

- The difference between the impacts of total residential construction and the two estimates of renovation construction;
- The difference between the impacts of the estimated renovation input structures; and
- The differences between the regional impacts of residential renovation construction and all types of residential construction.

The impacts which are examined in this study are the employment and income impacts in each of the direct, indirect and induced rounds of activity.

INTERPRETING THE RESULTS

There are several points on which caution must be exercised in the interpretation of the results of the analysis presented in this report.

The Nature of Renovation

The renovation estimates presented here are a sort of catch-all average of a diversity of work ranging from repairs (though not to include repairs) to the almost complete reconstruction of an existing structure. There are many types of renovations, and there is little doubt that the impacts of different types of renovation work will vary.

The estimated impacts are also relatively rough compared to the types of results one might expect from an exhaustive study of the residential renovation construction industry - the detailed survey work required for such an exhaustive study could not be attempted for this report. The results should be viewed mainly as an indication of the broad magnitudes of differences between new construction work and renovation work. The use of total residential construction as a proxy for new construction is also open to some question, though the impacts of the two should be close because new work comprised an estimated 36 percent of the total in Ontario in 1979.

Differences in Job Size

The analysis of the impacts presented in the next chapter indicates that the employment and income impact per dollar expenditure on renovation is greater than it is for total construction (taken as a proxy for new work). It does not necessarily follow from this, however, that promotion of renovation work, at the expense of new work, will generate more jobs - it depends on the relative value of the work done. For example, if the average value of the new work is significantly higher than the average value of the renovation work, the labour impact can be greater for the new work on a job-to-job basis even though it is not on a dollar-to-dollar basis.*

Changes Since 1976

The latest Statistics Canada Input-Output Model is for the year 1976 and this was the model used for the estimation of the impacts presented in this study. Therefore, all results are presented in 1976 dollars and employment. There have been changes in the absolute and relative costs of construction labour and materials since 1976, as well as in the profit levels of residential construction companies and the mix of dwelling types, etc. In addition, there has been a corresponding shift in importance regarding the composition of the input structure for materials. As an example since 1976, home insulation has become increasingly important with each rise in fuel prices. These changes will, of course, affect both the absolute and relative levels of impacts of the assumed \$100 million expenditure for all three input structures. It is considered that the effects of these factors on the incomes generated will not be so great as to nullify the results, but the employment generated will be less than the amounts shown, to the extent that average wages and salaries in the construction industry have risen by 32 percent between June, 1976 and June, 1980 in Toronto and other incomes have increased in similar proportions.

* The example can be best illustrated with actual numbers: A new job with say a 30 percent direct labour input and an average value of \$60,000 will yield a direct labour impact of \$18,000; a major renovation job with a 50 percent direct labour input but an average value of just \$30,000 will yield a direct labour impact of only \$15,000. Also, this ignores the indirect and induced impacts which, all told, would result in much higher impacts from new than from renovation work. The numbers in this example are for illustrative purposes only and do not necessarily reflect actual estimates.

RESULTS

On a dollar for dollar basis, there can be little doubt that residential renovation construction activity generates significantly more employment and income than does new residential construction work. The proportion of direct construction labour requirements is much higher for renovation than for new work and this more than offsets the lower indirect employment and income impacts resulting from the smaller building materials requirements of renovation work.

Before discussing further the overall results of the analysis, the direct, indirect and induced impacts of each of the two estimated residential renovation activities, as well as total residential construction, are examined separately.

DIRECT IMPACTS

Following discussions with several renovation experts as well as an examination of the available literature on the subject, it was apparent that there was a considerably higher direct labour component involved in renovation construction work than in new work. The estimates derived from a report prepared for Canada Mortgage and Housing Corporation by Scanada Consultants in 1979 was that about 50 percent of renovation expenditure goes to labour.* This estimate corroborated the general impressions gained in the course of this study. The comparable figure for new construction is not available, however, it is apparent that it would be below the 29.7 percent figure for total residential construction since both of the other components of total residential construction (renovation and repair) have a higher than the average labour component).

The direct construction labour impacts in terms of income and employment for a \$100 million expenditure on the three types of residential construction in 1976 are presented in Table 1.

* Scanada Consultants Limited, The Potential Market for Residential Renovation in Canada: A Pilot Survey of Halifax, 1979. See page A-5 of Appendix A for a review of the relevant information from the Scanada report.

TABLE 1: DIRECT INCOME AND EMPLOYMENT IMPACTS
OF \$100 MILLION EXPENDITURE ON RESIDENTIAL CONSTRUCTION
CANADA, 1976

	Total Residential Construction	Renovation Estimates	
		I U.S. Based	II Renovators
Income (\$ Million)			
Labour Income	29.7	50.0	50.0
Other Household Income	7.5	7.5	7.5
Indirect Taxes	5.4	3.5	3.5
Other	7.0	6.0	6.0
Total	49.6	67.0	67.0
Employment (Manyears)	2,025	3,406	3,406

Source: Clayton Research Associates, see Appendix B, Tables B-1 to B-9.

The direct employment generated under both of the renovation assumptions is about 3,400 manyears, which is nearly 1,400 manyears more than the 2,025 manyears of employment generated by a similar expenditure on total (new, repair and renovation) residential construction.* It would appear likely that employment generated by such an expenditure on new residential construction alone would be lower still.

The income generated is also different - \$67 million for renovation versus \$50 million for total. Because of the higher employment proportion in renovation work, it stands to reason that total labour income generated by a specific expenditure would be higher in renovation work than in all types of residential construction work taken together. Other household income is the same for both total and renovation work, but indirect taxes are lower for renovation work (due to lower materials requirements). Other income is lower as well - other income includes business income such as depreciation, undistributed profits, etc.**

* The two renovation estimates were both based on an assumption of 50 percent labour content so their direct results are the same. The variation occurs in the indirect impacts (next section).

** See Appendix A, page A-8 for a more detailed definition of these items.

INDIRECT IMPACTS

One of the main questions to be answered by this study was whether the higher direct employment generated by renovation work would be offset by the lower indirect employment generated in industries supplying inputs to the construction industry. The answer is no. While indirect employment impacts are less for renovation, the difference is not as great as is the difference in direct employment.

TABLE 2: INDIRECT INCOME AND EMPLOYMENT IMPACTS
OF \$100 MILLION EXPENDITURE ON RESIDENTIAL CONSTRUCTION
CANADA, 1976

	Total Residential Construction	Renovation Estimates	
		I U.S. based	II Renovators
Income (\$ Millions)			
Labour Income	23.5	15.2	15.0
Other Household Income	4.5	2.9	2.9
Indirect Taxes	1.3	0.9	1.2
Other	7.9	5.0	5.1
Total	37.2	24.0	24.2
Employment (Manyears)	1,741	1,128	1,108

Source: Clayton Research Associates, see Appendix B, Tables B-2 to B-9.

Clearly, for a given expenditure, there are significantly greater indirect employment impacts associated with total residential construction taken together than for renovation work. On a \$100 million expenditure, because of greater materials requirements, over 600 more manyears of indirect employment are generated through total residential construction (mostly new activity) than for either of the two Renovation Estimates. While significant, however, this difference only goes half way towards making up the direct employment shortfall of almost 1,400 manyears difference between total residential construction and the renovation estimates.

The differences in labour income generated by the \$100 million naturally reflect the employment differences. Indirect taxes and other income also are lower for the estimated renovation work because of the relatively small proportion of the initial \$100 million total available for expenditure on other goods and services (after the 50 percent cut for direct labour inputs).

Another interesting result from Table 2 is that despite significant differences in the materials used in the two Renovation Estimates, there is virtually no difference in the impacts of these two different versions of renovation activity. Since the two Renovation Estimates were designed to represent first, the "average" for all types of renovation activity and, second, a specific renovation of a Toronto brick house, it appears logical to conclude that on a per dollar basis the goods and services purchased by these two activities have similar labour requirements.

INDUCED IMPACTS

Induced impacts are those which result from the so-called "Keynesian Multiplier". They are the impacts of the expenditure of the income accruing to households in the direct and indirect rounds. The multiplier is based on the amount of household income (labour income plus other household income from Tables 1 and 2) which is available for expenditure by households after taxes and savings are deducted.

Because the estimated total household incomes resulting from the direct and indirect impacts of the renovation work are significantly larger than the incomes generated for total residential construction, it is to be expected that the induced employment and income impacts of renovation work will be larger as well.

TABLE 3: INDUCED INCOME AND EMPLOYMENT IMPACTS
OF \$100 MILLION EXPENDITURE ON RESIDENTIAL CONSTRUCTION
CANADA, 1976

	Total Residential Construction	Renovation Estimates	
		I U.S. based	II Renovators
Income (\$ Million)			
Labour Income	27.5	31.9	31.8
Other Household Income	10.5	12.1	12.1
Indirect Taxes	10.3	12.0	11.9
Other	10.7	12.5	12.4
Total	59.0	68.5	68.2
Employment (Manyears)	2,839	3,289	3,285

Source: Clayton Research Associates, see Appendix B, Tables B-3 to B-9.

Since the induced expenditures relate to a standard package of goods and services inputed into the Input-Output Model, the distribution of impacts among the different types of income would be expected to be similar for each of the activities even though the magnitudes are different.

TOTAL IMPACTS

The sum of the direct, indirect and induced impacts for each of the two renovation estimates and the total construction estimates indicates the significance of the difference in overall impacts of these activities.

TABLE 4: TOTAL INCOME AND EMPLOYMENT IMPACTS
OF \$100 MILLION EXPENDITURE ON RESIDENTIAL CONSTRUCTION
CANADA, 1976

	Total Residential Construction	Renovation Estimates	
		I U.S. Based	II Renovators
Income (\$ Million)			
Labour Income	80.7	97.1	96.8
Other Household Income	22.5	22.5	22.5
Indirect Taxes	17.0	16.4	16.6
Other	25.6	23.5	23.5
Total	145.8	159.5	159.4
Employment (Manyears)	6,605	7,823	7,799

Source: Clayton Research Associates, see Appendix B Tables B-4 to B-9.

For a \$100 million expenditure, over \$16 million more labour income would be generated if the expenditure related to residential renovation construction than if it was for total residential construction. The impacts on other types of income are generally similar though some interesting differences do occur. The slightly higher level of indirect taxes for total residential construction likely reflects the higher direct materials requirements of this activity compared to renovation work - this was sufficiently higher to offset the higher indirect taxes of renovation activities in the induced round. Another interesting difference is the higher "other" component (depreciation, undistributed profits, etc.) for total construction; since impacts from other industries were lower

under the renovation estimates, it might be expected that these would be lower since there would have been less income to businesses. Also, it was one of the assumptions in the renovation estimates that depreciation would be a smaller part of total expenditure in renovation work than in new construction.*

The breakdown of employment impacts among the various industries in the economy presents an interesting basis for comparison among the three estimated activities.

TABLE 5: TOTAL IMPACT ON EMPLOYMENT
OF \$100 MILLION EXPENDITURE ON RESIDENTIAL CONSTRUCTION
CANADA, 1976

	(Manyyears)	Renovation Estimates	
		I U.S. Based	II Renovators
	Total Residential Construction		
Primary Industries	290	286	278
Manufacturing Industries			
Wood	259	164	92
Metal and Machinery	338	254	288
Electrical Products	60	63	66
Non-Metallic Mineral Products	123	66	82
Other	594	604	616
Total	<u>1,374</u>	<u>1,151</u>	<u>1,144</u>
Construction	2,094	3,477	3,477
Transportation, Communication and Utilities	400	382	380
Trade	1,120	1,134	1,130
Services	<u>1,327</u>	<u>1,393</u>	<u>1,390</u>
Total	6,605	7,823	7,799

Source: Clayton Research Associates, derived from special
Statistics Canada input-output tabulations.

It is clear that the increased employment impact of residential renovation construction is felt right in the construction work force itself. For the given \$100 million expenditure, almost 1,400 more manyyears of construction industry employment resulted from the renovation estimates than from the total residential construction estimate - the new residential construction figure would likely have been lower still. However, along with the higher employment levels in the construction industry, the renovation estimates generate over 200 fewer jobs in manufacturing for the given expenditure than does the total residential estimate. The impacts on other industries do not differ significantly among the three estimates.

* See Appendix A, pages A-4 to A-8.

It is possible to see some effects of the variation in the two renovation estimate input structures in the manufacturing jobs generated. The differences are relatively small, however.

INTERREGIONAL IMPACTS

An estimate of the distribution of the employment impacts of a \$100 million expenditure on residential construction in Ontario among all the regions of Canada was obtained from a special set of additional computer runs on Statistics Canada's Interregional Input-Output Model.

TABLE 6: INTERREGIONAL EMPLOYMENT IMPACTS
RESULTING FROM THE EXPENDITURE OF \$100 MILLION
ON RESIDENTIAL CONSTRUCTION IN ONTARIO
(Many years)

	<u>Ontario</u>	<u>Quebec</u>	<u>Other Provinces</u>	<u>Total</u>
<u>Total Residential Construction</u>				
Direct	2,025	-	-	2,025
Indirect	1,280	312	149	1,741
Induced	2,080	543	216	2,839
Total	<u>5,385</u>	<u>855</u>	<u>365</u>	<u>6,605</u>
<u>Renovation Estimate I</u>				
Direct	3,406	-	-	3,406
Indirect	837	202	89	1,128
Induced	2,406	576	228	3,289
Total	<u>6,728</u>	<u>778</u>	<u>317</u>	<u>7,823</u>
<u>Renovation Estimate II</u>				
Direct	3,406	-	-	3,406
Indirect	831	176	101	1,108
Induced	2,483	574	228	3,285
Total	<u>6,720</u>	<u>750</u>	<u>329</u>	<u>7,799</u>

Source: Clayton Research Associates, derived from special Statistics Canada input-output tabulations (See Appendix B, Table B-10).

Clearly the vast majority of employment either in residential renovation construction or in total residential construction occurs in Ontario. In the estimates here, 86 percent of the employment generated by renovation work occurs in Ontario - the figure for total residential construction is only slightly lower at 82 percent.

QUALIFICATIONS

The last section of the previous chapter entitled "Interpreting the Results" warned about exercising caution in drawing conclusions from this analysis. It seems prudent to repeat the concerns:

- There is little doubt that, on a dollar-for-dollar basis, residential renovation construction has a greater income and employment impact than new construction; however, this does not mean that renovation of a dwelling rather than building a new one will result in more employment. Only if the actual values of work done per job are similar would the conclusion be true for a job-to-job comparison. Of course, residential renovation construction work is valued at substantially less than new work (about \$4,500 for renovations with building permits in Toronto in 1979); however, even major renovations will normally cost less than a new dwelling; in Toronto in 1979, even the average value of renovation building permits issued with a minimum of \$25,000 had an average value of less than \$45,000.
- The results are based on 1976 input-output data so they cannot be readily applied to 1980 without significant adjustments to take account of inflation, changes in relative costs in inputs, and differences in the construction mix of dwelling types, methods, etc., between 1976 and 1980.
- The methods used in estimating the input structures for residential renovation construction were relatively crude; a substantial survey of renovation contractors would be necessary to construct a proper input structure. The results should be indicative, however, of the broad magnitude of differences between total residential construction work and residential renovation construction work.

APPENDIX A

APPENDIX A - TABLE OF CONTENTS

	<u>Page</u>
APPENDIX A - ESTIMATING THE RENOVATION INPUT STRUCTURE	A-1
INPUT STRUCTURES	A-1
BROAD DIFFERENCES IN RESIDENTIAL CONSTRUCTION	
INPUT STRUCTURES	A-3
ESTIMATED CONSTRUCTION COST BREAKDOWNS	A-6
FINER DIFFERENCES IN RESIDENTIAL CONSTRUCTION	
INPUT STRUCTURES	A-7
Builders Margins	A-8
Labour Income	A-8
Materials and Services	A-9
(i) Renovation Estimate I - The Input Structure	
Based on U.S. Data	A-12
(ii) Renovation Estimate II - The Input Structure	
Based on Renovators' Observations	A-14

APPENDIX A - ESTIMATING THE RENOVATION INPUT STRUCTURE

The Statistics Canada Input-Output Model does not differentiate between new, repair and renovation construction work on residential buildings, they are all lumped together into the total residential construction category. In order to compare the impacts of renovation work with other types of residential construction activity through the use of the Statistics Canada Input-Output Model, it was, therefore, necessary to attempt to derive an input structure for residential renovation work alone.

INPUT STRUCTURES

An input structure is simply the distribution of an expenditure on any particular economic activity among all the different inputs necessary for that activity. Residential construction work, for example, requires inputs of direct construction labour, wood products, cement products, metal products and a host of other things. The input structure for total residential construction activity in the Statistics Canada Input-Output Model (1976) is broken down among 187 separate inputs. Table A-1 presents a simplified version of this input structure.

TABLE A-1: SIMPLIFIED INPUT STRUCTURE
TOTAL RESIDENTIAL CONSTRUCTION
CANADA, 1976

<u>Inputs</u>	<u>Percent of Total Expenditure</u>
Wood Products (10 categories)	12.2
Cement Products (5 categories)	2.4
Heat Equipment (7 categories)	2.1
Other Materials (133 categories)	18.8
Wholesale and Retail Margins (2 categories)	6.0
Services (21 categories)	8.9
Indirect Taxes (3 categories)	5.4
Wages and Salaries (1 category)	28.0
Supplementary Labour Income (1 category)	1.7
Unincorporated Business Income (1 category)	5.1
Household Investment Income (1 category)	2.4
Capital Cost Allowance (1 category)	3.2
Other Surplus (1 category)	3.8
Total (187 categories)	<u>100.0</u>

Source: Clayton Research Associates, derived from Statistics Canada input-output tabulations.

Many of the input categories shown in Table A-1 have been aggregated from a number of more specific categories, they are presented here only in order to demonstrate the concept of input structures and the rough breakdown of total residential construction among the different types of inputs.

Formulating an input structure for any type of activity is necessarily a highly complex endeavour. Given the time and budget constraints of this study, it was not possible to undertake the type of detailed survey work and analysis which would have been behind the split-up of the total residential construction among the 187 separate types of inputs (simplified to 13 inputs in Table A-1). Two approaches were adopted in attempting to estimate a Canadian residential renovation input structure:

- The United States input-output model does differentiate between new and renovation residential construction activity; based on the differences in these U.S. input structures and the overall differences between the Canadian and American total residential input structures, an estimated Canadian residential renovation input structure was formulated; and
- Based on discussions with renovation contractors and other persons knowledgeable about the inputs required for renovation activity, the total residential construction input structure was modified to approximate an estimated renovation input structure.

Both approaches utilize the 1976 Canadian input structure for total residential construction as their starting point - changes are made only for explicit reasons which appear justified based on the analysis involved in one or the other of the two above approaches.

Neither of the two estimated input structures which are derived by this study is considered to be as reliable as the type of input structure which Statistics Canada would formulate following detailed surveys of renovation contractors and suppliers, etc.* The results are, however, considered to be indicative of the general direction and broad magnitudes of the differential impacts of renovation versus new residential construction - the purpose of the report.**

* Statistics Canada and Canada Mortgage and Housing Corporation are currently exploring the possibility of formulating separate renovation and new input structures for residential construction, however, it appears unlikely that results will be forthcoming for some time.

** New construction accounts for over half of all residential construction in Ontario (renovation was about 15 percent and repair was about 23 percent in 1979). Because it makes up such a large proportion, the "total" results are often assumed in this study to be applicable generally to what the "new" results would have been.

The following sections of this Appendix present the steps involved in deriving the input structures used in the analysis of the impacts of renovation versus new residential construction.

BROAD DIFFERENCES IN RESIDENTIAL CONSTRUCTION INPUT STRUCTURES

The first step in formulating the renovation input structure was to split the total residential construction inputs into a small number of distinct categories since it would clearly be impossible to deal with 187 categories simultaneously. Table A-1 already had simplified the inputs into 13 categories, Table A-2 further combines them into 3 categories.

TABLE A-2: THREE CATEGORY INPUT STRUCTURE
TOTAL RESIDENTIAL CONSTRUCTION
CANADA, 1976

	<u>Percent of Total Expenditures</u>
Materials, Services, Margins, and Indirect Taxes	55.8
Wages, Salaries and Supplementary Labour Income	29.7
Other Income	14.5
	<u>100.0</u>

Source: Clayton Research Associates, derived from Statistics Canada input-output tabulations.

The three categories shown in Table A-2 can generally be considered to approximate the following three items in a building contractor's calculations:

- Real cost of material and service inputs;
- Labour costs; and
- Builder's margin for depreciation, income and profit.

It is widely assumed, and rightly so according to the findings of this study, that the ratio of labour to material and other inputs (items 1 and 2 alone) is quite different for renovation versus new residential construction. Little is known, however, about builders' margins - for this reason, it is explicitly assumed in this study that these margins will remain almost the same for all types of residential construction activity. The analysis of input structure differences deals primarily with the 85.5 percent of construction expenditure which goes into materials versus labour inputs.

The word materials is used broadly in this section to cover all material and service inputs as well as the related categories of retail and wholesale margins and indirect taxes. Labour covers all wages and salaries as well as supplementary labour income which includes other expenditures on labour by employers.

Almost all sources covered in the course of this study indicated that the proportion of labour required in renovation work is considerably higher than that which is required for new work. There are many possible reasons for this, but the main ones appear to be:

- Craft work required for renovation work on older buildings is frequently quite different from the labour-saving methods used on most new construction;
- Almost all renovation work is one-of-a-kind compared to near production-line conditions in many new construction jobs in fringe subdivisions and this requires greater labour input;
- Much renovation work requires only reworking, repairing or reusing the original construction materials; and
- Demolition or gutting of parts of the building is frequently the starting point for renovation work and this requires only labour.

Estimating the overall materials/labour ratio for an activity as diverse as residential renovation construction from the evidence available is no simple task. Renovation means different things to different people; one renovator consulted in the course of this study described the range of activities involved in renovation:

- Rebuilds - only 10 percent of the construction cost is saved, mainly in formulations, sub-floors and perhaps rafters;
- Restorations - 50 percent of the construction cost is saved, adding windows, studding, plaster and flooring to the items saved in rebuilds; and
- Fluff-ups - up to 85 percent of the construction cost is saved, most work is associated with modernizing plumbing or wiring, as well as repainting, etc.

Each of these activities will have different types of impacts which could justifiably be the subject of a study such as the present one.

In a report prepared for Canada Mortgage and Housing Corporation in 1979, Scanada Consultants quantified the proportions of construction costs accruing to labour versus materials, etc., for both major renovation work and maintenance and repair - these showed very high proportions of labour for both types of work. The Scanada findings which were based on a study of Halifax confirmed the impressions gained from discussions with persons knowledgeable about the renovation construction industry. The Scanada results are presented in Table A-3 along with the corresponding information from Table A-2 for total residential construction.

TABLE A-3: ESTIMATES OF COST BREAKDOWN
FOR RESIDENTIAL CONSTRUCTION
(Percent of Total Expenditures)

	<u>Materials</u>	<u>Labour</u>	<u>Overhead*</u>	<u>Total</u>
<u>Scanada (Halifax 1979)*</u>				
Maintenance and Repair	25	57	18	100
Major Renovation Work	32	50	18	100
<u>Statistics Canada Input-Output Tables (1976)</u>				
Total Residential Construction	55.8	29.7	14.5	100

* The breakdowns of what is included in materials, labour and overhead (especially the latter) categories is not clearly defined in the Scanada report so there are problems associated with strict comparisons with the Statistics Canada figures. The broad differences, however, are illustrative of likely differences in the impacts by type of construction.

Source: Scanada Consultants Limited, The Potential Market for Residential Renovation in Canada: A Pilot Survey of Halifax, 1979, page 31; and Clayton Research Associates, derived from Statistics Canada input-output tabulations.

The Scanada report implied that the labour component shown in Table A-3 might even understate the situation because some off-site support labour may not be included. Despite this, it is considered unlikely that the direct labour proportions of total renovation work to be used in this study should be raised beyond the level of 50 percent of total cost. This was the general level which emerged from discussions with most people knowledgeable about the renovation construction industry and it is not out of line with the Scanada findings.

The United States Input-Output Model does distinguish between new and renovation residential construction work but does not provide as detailed a breakdown of inputs as would be desirable. While the total construction category provides all the details required, the new and renovation residential construction input structures lump labour and builders' margins together so it is not possible to differentiate these important categories. The total of these two categories together declines slightly for renovation work compared to new work and, on the surface, these might appear to imply that the labour component may be less in renovation work than in new. This is an area of considerable uncertainty and conclusions are hard to draw, but two reasons why the overall proportion of labour and builders' margins might be lower in renovation work in the U.S. model are:

- Owners' own labour is not included in the renovation estimate, but materials used are - this would seriously understate labour's contribution to the total; and
- Some items of builders' margins would appear likely to be lower for renovation work than new work, e.g., depreciation of capital.

For this reason, the U.S. input-output data have not been used to assist with the breakdown of construction by materials, labour and margins. As will be seen later, the U.S. data has been used in one set of estimates regarding the types of materials used in renovation work compared to new work.

ESTIMATED CONSTRUCTION COST BREAKDOWNS

The overall proportion of expenditure on residential renovation construction which accrues directly to construction labour is assumed in this report to be approximately 50 percent; this is similar to the Scanada estimate (above) and is broadly in agreement with the "gut feel" of persons close to the renovation industry. Builders' margins are assumed to be slightly lower on average in renovation work than in total residential construction (13.5 percent compared to 14.5 percent for the total) because of lower assumed use of capital equipment (and, hence, less depreciation). The materials proportion is the remainder and is, therefore, assumed to be only 36.5 percent for renovation work compared to 55.8 percent in total residential construction.

TABLE A-4: ASSUMED COST BREAKDOWNS
RESIDENTIAL CONSTRUCTION
CANADA, 1976

	<u>Materials</u>	<u>Labour</u>	<u>Builders' Margins</u>	<u>Total</u>
Residential Renovation Construction	36.5	50.0	13.5	100.0
Total Residential Construction	55.8	29.7	14.5	100.0

Source: Estimates by Clayton Research Associates.

One must beware of putting too great a reliance on the above estimated breakdowns for residential renovation construction since they were derived by relatively rough methods. The renovation estimates should be viewed as broadly indicative of the direction of the difference between total versus renovation work. Whether the labour proportion of renovation work is 50 percent, or 55 percent or 45 percent, the difference between the impacts of renovation versus total work will be evident from this analysis - and this is the main purpose of the exercise.

FINER DIFFERENCES IN RESIDENTIAL CONSTRUCTION INPUT STRUCTURES

Not only will there be the differences (shown above) in the overall proportions of the total expenditure accruing to labour and materials in renovation compared to new residential construction work, the shares of different types of trades and different types of materials will, no doubt, vary as well. On a job to job comparison, there would appear likely to be less cement, bricks and lumber in renovation work than in new work, but, according to the sources contacted in the course of the study, there would be similar amounts of wiring, plumbing and wallboard required. The types of tradesman required would also no doubt be different, too.

The treatment by this study of each of the major components involved in residential construction work is discussed below.

Builders' Margins

There are four categories covered under this broad heading:

- Net Income of Unincorporated Business - 5.1 percent of total residential construction expenditure - this category covers the net earnings of working proprietors and partnerships, earnings from independent professional practice and net rental income;
- Household Investment Income - 2.4 percent of total residential construction expenditure - this category includes the interest, dividend and other investment income of households;
- Capital Cost Allowance - 3.2 percent of total residential construction expenditure - this category includes estimates of capital consumption or depreciation; and
- Other Surplus - 3.8 percent of total residential construction expenditure - this category covers a variety of other types of items including undistributed corporate profits, inventory valuation adjustments, among others (in some of the later discussions in Appendix B, this category is assumed to include capital cost allowance as well).

As was discussed above, these four categories taken together comprised 14.5 percent of total residential construction expenditure in 1976 and this has been assumed to change only marginally between total and renovation work - the capital cost allowance item is assumed to be one percentage point lower in renovation work (2.2 percent). The distribution of the remainder among the other three categories is assumed not to change for total versus renovation work.

Labour Income

There are two categories covered under this heading:

- Wages and Salaries - 28.0 percent of total residential construction expenditure - this category covers all payments, including payments-in-kind such as board and lodging and other income such as bonuses, commissions, etc., to wage earners and salaried employees; and

- Supplementary Labour Income - 1.7 percent of total residential construction expenditure - this category consists of all expenditures by employers on labour not covered in the wages and salaries category, it includes employers' contributions to unemployment insurance and pension funds, etc.

This overall category is assumed to increase from the 29.7 percent of expenditure for total residential construction to 50.0 percent of residential renovation construction. It is further assumed that the relative ratios of wages and salaries compared to supplementary labour income do not change, i.e., of the 50.0 percent, wages will comprise 47.1 percent while supplementary labour income will comprise 2.9 percent (the same ratio as 28.0/1.7).

Materials and Services

This is the largest category of total residential construction (55.8 percent) though, as was discussed above, it is assumed in this study to account for only 36.5 percent of total expenditure on residential renovation work. The major breakdown is between materials, services, margins and taxes.

TABLE A-5: PERCENT OF RESIDENTIAL CONSTRUCTION
EXPENDITURE BY EXPENDITURE ITEM
CANADA, 1976

<u>Expenditure Item</u>	<u>Percent of Total Residential Construction Expenditure</u>	<u>Percent of Materials, Services, Taxes and Margins</u>	<u>Estimated Percent of Residential Renovation Construction Expenditure</u>
Materials	35.5	63.6	23.21
Services	8.9	16.0	5.84
Wholesale and Retail Margins	6.0	10.7	3.91
Indirect Taxes	5.4	9.7	3.54
Subtotal	55.8	100.0	36.50
Other (Wages and Salaries and Builders' Margins)	44.2		63.50
Total	100.0		100.00

Source: Clayton Research Associates, derived from Statistics Canada input-output tabulations.

In reducing the proportion of total expenditure accounted for by this group from 55.8 percent to 36.5 percent some assumption must be made about the relative declines of each component. Since wholesale and retail margins and indirect taxes are essentially related to the volumes of materials and services, not to total expenditure, these categories are assumed to retain their relative proportions of the category (10.7 percent and 9.7 percent respectively).

Within the broad 63.6 percent materials category, however, it is evident that there are considerable differences between the materials requirements of new versus renovation work. For example, less wood and cement would be required for a typical renovation job than for a new job whereas plumbing and electrical types of materials would be required in almost the same proportions as new work for many renovation jobs. There are over 150 categories in the broad materials group, ranging from important items such as floor coverings, bricks and wood products to relatively unimportant ones such as alcoholic beverages, books, and rubber tires. It was considered to be beyond the scope of this study to attempt to adjust each of these items individually so only the important items were selected for detailed study - these selected items are presented in Table A-6 along with the percentage of total Canadian residential construction expenditure which they comprised in 1976.

Two alternative methods of adjusting the relative importance of the items in the detailed materials breakdown to reflect the requirements of renovation as opposed to total construction were explored:

- Renovation Estimate I - using the difference in detailed materials usage in the U.S. renovation/total residential input structures as a guide to the difference in the Canadian total residential input structure; and
- Renovation Estimate II - estimating the detailed materials usage on a renovated house using the observations of knowledgeable people in the renovation industry as a guide.

These two methods produced different materials input requirements. These were fed into the Statistics Canada Input-Output Model separately so as to produce a range of results from which the sensitivity of changing the materials involved in the input structure could be gauged.

TABLE A-6: PERCENT OF TOTAL RESIDENTIAL
CONSTRUCTION EXPENDITURE BY EXPENDITURE ITEM
CANADA, 1976
(Percent)

<u>Expenditure</u>	<u>Percent of Total Expenditure</u>
<u>Materials</u>	
Plastic Film	0.7473
Textile Floor Coverings	0.7365
Lumber and Timber	2.4572
Veneer and Plywood	2.2602
Millwork	3.3240
Fabricated Wood	0.4830
Prefab. Wood Structures	2.1413
Wood Fab. Material NES	0.5350
Building Paper and Board	0.8068
Prefab. Metal Structures	0.8205
Architectural Metal Products	3.1482
Pipes, Siding, Sheet Metal NES	2.4023
Heat Equipment, Water Tanks, Heaters, Plumbing, etc. (7 categories)	2.0826
Electric Wire and Fixtures (5 categories)	1.2562
Cement and Concrete Products (5 categories)	2.4409
Clay Brick and Tiles	0.6504
Gypsum Products	1.0207
Insulation Materials	0.5633
Glass in Fibrous Products	0.5471
Paint	0.2691
Sub-Total (34 categories)	28.6926
Other Materials (121 categories)	6.8452
Total Materials (155 categories)	35.5378
<u>Services</u> (21 categories)	8.8969
<u>Wholesale and Retail Margins</u>	5.9609
<u>Indirect Taxes</u> (3 categories)	5.4064
<u>Other (Wages and Salaries, and Margins, etc.)</u>	44.1980
<u>Total</u> (187 categories)	100.0000

Sources: Clayton Research Associates derived from Statistics
Canada input-output tabulations.

(i) Renovation Estimate I - The Input Structure Based on U.S. Data

The method used in this case consisted of examining the difference between the amount of a commodity which was used in the latest U.S. input-output tabulations in both total residential construction and residential renovation construction. The same relative difference was then applied to the Canadian data for total residential construction to obtain an approximation for residential renovation construction in Canada; an example will clarify the process:

Cement and concrete products accounted for:

4.3459 percent of U.S. total residential construction
 2.9578 percent of U.S. residential renovation
 construction
 2.4409 percent of Canadian total residential
 construction

Therefore, the estimated Canadian renovation proportion comprised by cement and concrete products is:

$$\frac{2.4409 \times 2.9578}{4.3459} = 1.6613$$

This procedure was carried out for each of the materials (and groups of materials) shown in Table A-6; then the totals were adjusted proportionately to comply with the overall estimated percentage of renovation construction inputs accruing to materials - i.e., the 23.21 percent from Table A-5 (from the 35.54 percent for the total residential construction in Table A-6). This resulted in cement and concrete products accounting for an estimated 0.8657 percent of expenditure on residential renovation construction. The revised input structure for all the materials based on the methodology explained above is presented in Table A-7.

TABLE A-7: RENOVATION ESTIMATE I - ESTIMATED RESIDENTIAL
RENOVATION INPUT STRUCTURE BASED ON U.S. INPUT-OUTPUT DATA
CANADA, 1976

<u>Materials</u>	<u>Percent of Total Expenditure</u>
Plastic Film	0.6566
Textile Floor Coverings	0.1056
Lumber and Timber	1.2941
Veneer and Plywood	1.5882
Millwork	2.7676
Fabricated Wood	0.2517
Prefab. Wood Structures	0.7089
Wood Fab. Material NES	0.2787
Building Paper and Board	0.4280
Prefab. Metal Structures	0.5754
Architectural Metal Products	2.2020
Pipes, Siding, Sheet Metal NES	1.1936
Heat Equipment, Water Tanks, Heaters, Plumbing, etc.	2.3687
Electric Wire and Fixtures	1.5109
Cement and Concrete Products	0.8657
Clay Brick and Tiles	0.2945
Gypsum Products	0.6453
Insulation Materials	0.3904
Glass in Fibrous Products	0.3127
Paint	0.3028
Sub-Total	<u>18.7414</u>
Other Materials	<u>4.4686</u>
Total Materials	23.2100

Source: Estimates by Clayton Research Associates
based on Statistics Canada and U.S. input-
output data.

The materials which are most noticeably underrepresented in the U.S. residential renovation input structure compared to new residential construction are floor coverings, cement and concrete, clay bricks and tiles and some types of wood products. Conversely, a great deal more of paints, heating and plumbing equipment, and electrical materials are required for residential renovation work than for new work in the U.S. Generally, the variations between the materials required for new versus renovation work based on U.S. data are in accord with the results of the interviews with renovators, however, there are some significant differences. These differences will be discussed following the presentation of the second renovation input structure.

(ii) Renovation Estimate II - The Input Structure Based on Renovators' Observations

The method used in this case consisted of quantifying the observations of knowledgeable people in the renovation industry in terms of the major materials outlined in Table A-6. This estimation procedure involved a substantial amount of judgement as to what constituted an "average" renovation job and the inputs required for that job, but it is considered that the resulting input structure is broadly indicative of major renovation jobs on single-detached and semi-detached brick dwellings in the City of Toronto.

The revised input structure for materials based on this estimation technique is presented in Table A-8.

TABLE A-8: RENOVATION ESTIMATE II - ESTIMATED RESIDENTIAL RENOVATION INPUT STRUCTURE BASED ON RENOVATORS' OBSERVATIONS
TORONTO, 1980

<u>Materials</u>	<u>Percent of Total Expenditure</u>
Plastic Film	0.5543
Textile Floor Coverings	0.5266
Lumber and Timber	0.6929
Veneer and Plywood	0.8315
Millwork	1.3858
Fabricated Wood	0.2079
Prefab. Wood Structures	0.2772
Wood Fab. Material NES	0.1386
Building Paper and Board	0.5543
Prefab. Metal Structures	0.5543
Architectural Metal Products	2.2173
Pipes, Siding, Sheet Metal NES	2.4945
Heat Equipment, Water Tanks, Heaters, Plumbing, etc.	2.7717
Electric Wire and Fixtures	1.6630
Cement and Concrete Products	0.8315
Clay Brick and Tiles	0.2772
Gypsum Products	1.1087
Insulation Materials	0.6929
Glass in Fibrous Products	0.6236
Paint	0.4158
Sub-Total (38 categories)	<u>18.8196</u>
Other Materials	<u>4.3904</u>
Total Materials	23.2100

Source: Estimates by Clayton Research Associates based on discussions with renovators and Statistics Canada input-output tabulations.

The materials that tended to be de-emphasized in renovation work compared to new work were generally those associated with the substructure (e.g., cement and concrete products), the structure itself (e.g., bricks and lumber) and some of the interior partitions work (e.g., fabricated wood products and millwork). On a job-by-job basis, several materials were considered to be equally or almost equally important in renovation work and new work - these materials included heating equipment, plumbing fixtures, electric wire and fixtures, gypsum products and paint.

The two estimated input structures are not intended to represent the same types of activity, so it would be expected that the input structures would be different. The input structure based on the U.S. data (Renovation Estimate I) is intended to represent all types of renovation activity in Canada - this includes minor as well as major renovations. The input structure based on discussions with renovators (Renovation Estimate II) is intended to represent only renovations on a single-family brick house in Toronto.

Since the only difference between the two estimated renovation input structures is in the volumes of different materials used in renovation work, any differences in the types of impacts between the two will be in the indirect round of impacts. Direct impacts will be the same; indirect impacts will show any differences resulting from changes in the types of materials required.

APPENDIX B

APPENDIX B - TABLE OF CONTENTS

	<u>Page</u>
APPENDIX B - THE IMPACTS	B-1
IMPACTS OF TOTAL RESIDENTIAL CONSTRUCTION	B-2
Income Impacts	B-2
(i) Direct Income Impacts	B-2
(ii) Indirect Income Impacts	B-3
(iii) Induced Income Impacts	B-4
(iv) Total Income Impacts	B-5
Employment Impacts	B-6
IMPACTS OF RENOVATION ACTIVITY - RENOVATION	
ESTIMATE I	B-8
Income Impacts	B-8
Employment Impacts	B-9
IMPACTS OF RENOVATION ACTIVITY - RENOVATION	
ESTIMATE II	B-11
Income Impacts	B-11
Employment Impacts	B-12
INTERREGIONAL IMPACTS	B-13

APPENDIX B - THE IMPACTS

This Appendix provides the detailed tabulations of the estimated impacts of residential renovation construction activity on employment and income. These impacts were derived from the three input structures described in Appendix A using the Statistics Canada Input-Output Model for Canada based on the year 1976. The three types of activity for which input structures were formulated and, therefore, for which the estimated impacts are available are:

- Total Residential Construction - the standard Statistics Canada classification covering both new and renovation construction activity;
- Renovation Estimate I - the estimate of renovation inputs based on U.S. construction experience; and
- Renovation Estimate II - the estimate of renovation inputs based on the views of renovation experts.

These three sets of input structures were each run through the Statistics Canada Input-Output Model for 1976. This model calculates, for each separate input, the amount of goods and services required from other industries, etc., as well as wages and salaries, business income and taxes to be paid. In this way, the impacts of construction activity on the whole economy can be gauged. For simplicity of comparison, a standard total expenditure of \$100 million was assumed for each of the sets. This relatively large amount was chosen so as to bring out all of the impacts whereas a smaller assumed expenditure might have overlooked some.

The results are summarized here in terms of three separate sets of impacts:

- Direct impacts - the employment and income resulting from the construction projects themselves;
- Indirect impacts - the impacts on other industries resulting from the production of the materials and other inputs necessary for the construction work; and
- Induced impacts - economic activity generated as a result of the so-called "Keynesian Multiplier" resulting from the expenditure of the incomes generated to households in the first two rounds.

The impacts which are most important for the purposes of this study were considered to be the employment and income impacts; these are the impacts which are examined below for each of the three types of activity studied.

IMPACTS OF TOTAL RESIDENTIAL CONSTRUCTION

Income Impacts

The income impacts of an expenditure on total residential construction are discussed in some detail under separate headings for each of the direct, indirect and induced rounds. This was considered necessary to clarify the concepts. In the subsequent discussions of the renovation estimates, they are not covered in the same level of narrative detail.

(i) Direct Income Impacts

The direct impacts of an expenditure on total residential construction were covered in Appendix A during the discussion regarding the formation of input structures.* Many of the inputs for the construction work are, of course, themselves impacts: e.g., wages and salaries, business income, indirect taxes, etc. Presenting the information somewhat differently from the input structure treatment, Table B-1 shows the direct income impacts of an expenditure of \$100 million on total residential construction.**

* See Appendix A Tables A-1 and A-2.

** See Appendix A pages A-8 and A-9 for a discussion of the items included in the various income categories in Table B-1.

TABLE B-1: DIRECT INCOME RESULTING FROM THE EXPENDITURE
OF \$100 MILLION ON TOTAL RESIDENTIAL CONSTRUCTION
CANADA, 1976

	<u>\$ Million</u>
Wages and Salaries	28.0
Supplementary Labour Income	1.7
Net Income of Unincorporated Business	5.1
Household Investment Income	2.4
Net Indirect Taxes	5.4
Other Surplus*	<u>7.0</u>
Total	49.6

* Includes capital cost allowance.

Source: Clayton Research Associates derived from
Statistics Canada input-output tabulations.

As will be recalled from the discussion in Appendix A, the remainder of the \$100 million expenditure goes to materials, services and margins. The materials and services purchased from other industries lead to the indirect impacts which are discussed next.

(ii) Indirect Income Impacts

The indirect income impacts are somewhat lower than the direct impacts, but they are still very significant.

TABLE B-2: INDIRECT INCOME RESULTING FROM THE EXPENDITURE
OF \$100 MILLION ON TOTAL RESIDENTIAL CONSTRUCTION
CANADA, 1976

	<u>\$ Million</u>
Wages and Salaries	21.9
Supplementary Labour Income	1.6
Net Income of Unincorporated Business	1.6
Household Investment Income	2.9
Net Indirect Taxes	1.3
Other Surplus	<u>7.9</u>
Total	37.2

Source: Clayton Research Associates derived from Statistics
Canada input-output tabulations.

Whereas the direct income impacts related to work in the residential construction industry alone, these indirect income impacts relate to all industries in the economy which provide inputs to the construction industry. There are some interesting differences in the composition of income from the two rounds:

- The relatively small amount accruing to unincorporated business in this indirect round is likely a reflection of the differences in the composition of firms in the construction industry compared to other types of industries; the construction industry has a greater proportion of unincorporated businesses; and
- Indirect taxes are significantly higher in the direct round than in the indirect round; this may reflect a higher rate of indirect taxation on the construction industry materials impacts than on the impacts of industries supplying the construction materials.

(iii) Induced Income Impacts

The direct and indirect rounds each provided income to households, business and government. Induced impacts result from the expenditure of this income to purchase more goods and services which leads to further employment and income being generated - this is the so-called "Keynesian Multiplier". For the purposes of this analysis some basic assumptions are required:

- The extra income accruing to the government through indirect taxes does not impact government expenditure patterns;
- Business surplus (depreciation allowances, undistributed profits, inventory valuation adjustments, etc.) is not respent on goods and services; and
- Household income from all sources (wages and salaries, supplementary labour income, income from unincorporated business and household investment income) is treated the same as far as household expenditure patterns are concerned.

Therefore, the incomes which are used as the base of the multiplier are the first four categories from Tables B-1 and B-2: wages and salaries, supplementary labour income, net income of unincorporated business and household investment income. The total direct and indirect income accruing to these four categories from the \$100

million initial expenditure on total residential construction is \$65.2 million.* Table B-3 summarizes the impacts of the expenditures resulting from this level of household income in Canada in 1976.

TABLE B-3: INDUCED INCOME RESULTING FROM THE EXPENDITURE
OF \$100 MILLION ON TOTAL RESIDENTIAL CONSTRUCTION
CANADA, 1976

	<u>\$ Million</u>
Wages and Salaries	25.8
Supplementary Labour Income	1.7
Net Income of Unincorporated Business	4.7
Household Investment Income	5.8
Net Indirect Taxes	10.3
Other Surplus	<u>10.7</u>
Total	59.0

Source: Clayton Research Associates derived from special Statistics Canada input-output tabulations.

The induced income impacts of the \$100 million expenditure on total residential construction in 1976 would have totalled \$59 million. Just under half of this would have been direct labour income.

(iv) Total Income Impacts

The income impacts of each of the three rounds are summarized in Table B-4 which also presents the sum of the three into the total income impact of a \$100 million expenditure on total residential construction in Canada in 1976.

* See Tables B-1 and B-2; the \$65.2 million is the sum of the four categories noted in each of the direct and indirect rounds.

TABLE B-4: INCOME RESULTING FROM THE EXPENDITURE
OF \$100 MILLION ON TOTAL RESIDENTIAL CONSTRUCTION
CANADA, 1976
(\$ Millions)

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Wages and Salaries	28.0	21.9	25.8	75.7
Supplementary Labour Income	1.7	1.6	1.7	5.0
Net Income of Unincorporated Business	5.1	1.6	4.7	11.4
Household Investment Income	2.4	2.9	5.8	11.1
Net Indirect Taxes	5.4	1.3	10.3	17.0
Other Surplus	7.0	7.9	10.7	25.6
Total	49.6	37.2	59.0	145.8

Source: Clayton Research Associates, derived from special Statistics Canada input-output tabulations (see Tables B-1, B-2 and B-3).

The total income generated by the initial \$100 million expenditure would have been \$145.8 million after all of the direct, indirect and induced factors are accounted for. More than half the total income (\$80.7 million) would have accrued to direct labour costs while net unincorporated business income and household investment income together would have totalled \$22.5 million. Indirect taxes would have totalled \$17 million while "other surplus" (composed of depreciation, undistributed business profits, etc.) would have accounted for the remaining \$25.6 million.

Employment Impacts

The direct, indirect and induced employment impacts of a \$100 million expenditure on total residential construction activity in 1976 are summarized in Table B-5.

TABLE B-5: EMPLOYMENT IMPACTS RESULTING FROM THE EXPENDITURE
OF \$100 MILLION ON TOTAL RESIDENTIAL CONSTRUCTION
CANADA, 1976
(Manyyears)

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Primary Industries	-	86	204	290
Manufacturing Industries				
Wood	-	249	10	259
Metal and Machinery	-	298	40	338
Electrical Products	-	38	22	60
Non-Metallic Mineral Products	-	115	8	123
Other	-	172	422	594
Total	-	872	502	1,374
Construction	2,025	17	52	2,094
Transportation, Communication and Utilities	-	159	241	400
Trade	-	319	801	1,120
Services	-	288	1,039	1,327
Total	2,025	1,741	2,839	6,605

Source: Clayton Research Associates, derived from special
Statistics Canada input-output tabulations.

The total employment impact of a \$100 million expenditure on total residential construction in 1976 would have been the creation of about 6,600 manyears of work spread across all industries. Almost one-third of these jobs would have been in the construction industry - the vast majority resulting from the direct round. Manufacturing industries would have been the next most heavily impacted, almost two-thirds of this would have been the result of materials purchases as a result of the initial construction expenditure with the remainder coming in the induced round. Service industries and trade together would have accounted for almost 2,500 of the jobs, mostly in the induced round resulting from household expenditures.

IMPACTS OF RENOVATION ACTIVITY - RENOVATION ESTIMATE I

This section reviews the hypothetical impacts of residential renovation construction activity under the assumption that the differences between materials used as inputs in renovation compared to total residential construction in Canada reflect the differences in the input requirements of these two activities in the United States.* The basic tables are similar in format to those of the preceding section so only minimal comment and explanation is provided.

Income Impacts

The income impacts of \$100 million spent on residential renovation construction activity are significantly higher in total than are the income impacts of residential construction as a whole. By implication, then, the income impacts of renovation activity are much higher than new construction activity.**

TABLE B-6: RENOVATION ESTIMATE I - INCOME RESULTING FROM THE EXPENDITURE OF \$100 MILLION ON RESIDENTIAL RENOVATION CONSTRUCTION CANADA, 1976
(\$ Millions)

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Wages and Salaries	47.2	14.1	29.9	91.2
Supplementary Labour Income	2.8	1.1	2.0	5.9
Net Income of Unincorporated Business	5.1	1.0	5.4	11.5
Household Investment Income	2.4	1.9	6.7	11.0
Net Indirect Taxes	3.5	0.9	12.0	16.4
Other Surplus	<u>6.0</u>	<u>5.0</u>	<u>12.5</u>	<u>23.5</u>
Total	67.0	24.0	68.5	159.5

Source: Clayton Research Associates, derived from special Statistics Canada input-output tabulations.

* See Appendix A for a detailed discussion of the methodology used for derivation of the input structures.

** The impact of new construction alone was not estimated in this study; however, it can be assumed that the inputs of total construction would closely approximate the impacts of new activity.

It would be obvious that the direct income impacts of Renovation Estimate I will be significantly higher than for total construction (Table B-4) because of the assumption that labour income represents approximately 50 percent of renovation expenditure versus only about 30 percent for total construction - thus, of the \$100 million expenditure on renovation construction, \$50 million (\$47.2 in wages and salaries and \$2.8 in supplementary labour income) is labour income.*

The main question to be answered by this analysis was whether the resultant lower indirect income impacts would offset the larger direct incomes from renovation compared to new construction. Indirect impacts will, of course, be lower for renovation because purchases of goods and services make up a smaller proportion of a renovation construction dollar than a new construction dollar. Clearly, however, the \$13 million difference in indirect incomes in favour of total construction is not sufficient to offset the \$20 million difference in direct income in favour of renovation.

The larger direct and indirect incomes resulting from renovation compared to total lead to a larger induced income as well, so this compounds the difference. Total income resulting from a \$100 million expenditure on residential renovation construction, under the Renovation Estimate I input assumptions, would have been almost \$160 million in 1976 compared to about \$146 million for a similar expenditure on total residential construction.

Employment Impacts

The difference in the employment impacts of residential renovation construction compared to total residential construction mirror the income impacts covered above.

* See Appendix A, pages A-3 to A-7 for a discussion of the reasoning behind these assumptions.

TABLE B-7: RENOVATION ESTIMATE I - EMPLOYMENT IMPACTS RESULTING
FROM THE EXPENDITURE OF \$100 MILLION ON
RESIDENTIAL RENOVATION CONSTRUCTION
CANADA, 1976
(Manyyears)

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Primary Industries	-	52	234	286
Manufacturing Industries				
Wood	-	153	11	164
Metal and Machinery	-	208	46	254
Electrical Products	-	37	26	63
Non-Metallic Mineral Products	-	57	9	66
Other	-	114	490	604
Total	-	569	582	1,151
Construction	3,406	11	60	3,477
Transportation, Communication and Utilities	-	102	280	382
Trade	-	206	928	1,134
Services	-	188	1,205	1,393
Total	3,406	1,128	3,289	7,823

Source: Clayton Research Associates, derived from special
Statistics Canada input-output tabulations.

The very large employment impact of renovation construction compared to total construction is more than enough to compensate for the reduced employment in supplying industries. The direct employment resulting from a \$100 million expenditure on residential renovation construction is over 1,250 manyears higher than the comparable figure for total residential construction.* The resulting indirect employment for the renovation work, however, is only about 600 manyears less than the comparable total construction figure. Induced employment for renovation is, of course, significantly higher than the total residential construction induced employment because of the higher total incomes associated with the renovation work. Total employment resulting from the \$100 million expenditure on renovation in 1976 would have been over 7,800 manyears, about 1,200 manyears higher than the 6,600 manyears for a similar expenditure on total residential construction.

* See Table B-5 for the comparable total residential construction figures.

There are also some interesting differences in the composition of industries impacted in the indirect round, though all major industries suffer more or less similar declines in renovation compared to total residential construction.

IMPACTS OF RENOVATION ACTIVITY - RENOVATION ESTIMATE II

This section reviews the hypothetical impacts of residential renovation construction activity under the input structure formulated as a result of discussions with experts in renovation construction.* The results are very similar to those of Renovation Estimate I reviewed above.

Income Impacts

Because the direct labour input assumptions used for Renovation Estimate I and Renovation Estimate II were exactly the same, the direct income impacts would be expected to be very similar - they are.

TABLE B-8: RENOVATION ESTIMATE II - INCOME RESULTING FROM THE
EXPENDITURE OF \$100 MILLION ON RESIDENTIAL RENOVATION CONSTRUCTION
CANADA, 1976
(\$ Millions)

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Wages and Salaries	47.2	13.9	29.8	90.9
Supplementary Labour Income	2.8	1.1	2.0	5.9
Net Income of Unincorporated business	5.1	1.0	5.4	11.5
Household Investment Income	2.4	1.9	6.7	11.0
Net Indirect Taxes	3.5	1.2	11.9	16.6
Other Surplus	6.0	5.1	12.4	23.5
Total	67.0	24.2	68.2	159.4

Source: Clayton Research Associates, derived from special Statistics Canada input-output tabulations.

* See Appendix A for a detailed discussion of the methodology used for derivation of the input structures.

While the direct labour input assumptions were the same for both renovation input structures, the materials and services inputs were not.* There was considerable variation in the types of materials inputs required under the two estimated structures. Nonetheless, there is relatively little impact on the amount and distribution of indirect incomes generated. Induced income impacts, of course, are also very similar.

The key assumptions in this analysis are clearly those made regarding the labour component of renovation compared to new construction. Variation of the materials inputs have been shown to have a relatively insignificant impact on the incomes generated.

Employment Impacts

The employment impacts of Renovation Estimate II are also very similar to those of Renovation Estimate I.

TABLE B-9: RENOVATION ESTIMATE II - EMPLOYMENT IMPACTS RESULTING
FROM THE EXPENDITURE OF \$100 MILLION ON
RESIDENTIAL RENOVATION CONSTRUCTION
CANADA, 1976
(Many years)

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Primary Industries	-	41	237	278
Manufacturing Industries				
Wood	-	81	11	92
Metal and Machinery	-	242	46	288
Electrical Products	-	40	26	66
Non-Metallic Mineral Products	-	73	9	82
Other	-	127	489	616
Total	-	563	581	1,144
Construction	3,406	11	60	3,477
Transportation, Communication and Utilities	-	101	279	380
Trade	-	204	926	1,130
Services	-	188	1,202	1,390
Total	3,406	1,108	3,285	7,799

Source: Clayton Research Associates derived from special Statistics Canada input-output tabulations.

* See Appendix A pages A-12 to A-14 for a discussion of these different input structures.

The difference between the overall employment impacts of the two renovation estimates are too close to discern any significant differences. There are, however, some differences between the industries which are impacted in the indirect round, resulting from the different materials input assumptions. The overall impact, even in this round, however, be considered to be the same.

INTERREGIONAL IMPACTS

The impacts discussed to this point relate to construction expenditure in Canada as a whole and the impacts on total Canadian incomes and employment. Several special tabulations were also obtained from Statistics Canada's Interregional Input-Output Model (1974) using the same input structures as those described above and in Appendix A and the same assumed \$100 million expenditure. Since the model itself is for a different year, the actual results are in different magnitudes (due to inflation, etc.). In order to reduce the confusion which might be generated by presenting two similar sets of employment results, the interregional model results were adjusted to the same totals as have been used above.

TABLE B-10: INTERREGIONAL EMPLOYMENT IMPACTS
RESULTING FROM THE EXPENDITURE ON \$100 MILLION
ON RESIDENTIAL CONSTRUCTION IN ONTARIO
(Manyyears)

	<u>Ontario</u>	<u>Quebec</u>	<u>Other Provinces</u>	<u>Total</u>
<u>Total Residential Construction</u>				
Direct	2,025	-	-	2,025
Indirect	1,280	312	149	1,741
Induced*	2,080	543	216	2,839
Total	5,385	855	365	6,605
<u>Renovation Estimate I</u>				
Direct	3,406	-	-	3,406
Indirect	837	202	89	1,128
Induced*	2,406	576	228	3,289
Total	6,728	778	317	7,823
<u>Renovation Estimate II</u>				
Direct	3,406	-	-	3,406
Indirect	831	176	101	1,108
Induced*	2,483	574	228	3,285
Total	6,720	750	329	7,799

* The distribution of the induced employment impacts is partially an estimate based on assumptions of the distribution of household expenditure patterns in other provinces resulting from the indirect round; the induced computer run was only obtained for Ontario household expenditures. The possible variation in employment in Ontario is about 50 manyears on either side of the induced estimate in all three cases.

Source: Clayton Research Associates, derived from special Statistics Canada input-output tabulations.

Because of the higher direct construction employment resulting from the estimates of renovation work, there is a greater concentration of total jobs created to Ontario than is the case with total residential construction. The distribution of the total of induced and indirect employment is about the same in all three estimates.

Most of the out-of-province employment goes to the Province of Quebec - logical, in view of the relative proximity of the two provinces. Quebec accounts for between 10 and 13 percent of total employment generated, while all other province combined account for only 4-6 percent of the total. The Province of Ontario accounts for about 82 percent of the total employment generated by total residential construction and about 86 percent of the larger total employment generated by the estimated residential renovation construction work. There is no significant difference in the dispersion of employment between the two renovation estimates.

